"We learn from each other":
An Assessment of Farmers' Experiences in the Participatory Research for Improved Agro-Ecosystem Management (PRIAM) Project

Final Report

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Introduction

The Participatory Research for Improved Agro-Ecosystem Management (PRIAM) project was initiated by the International Center for Tropical Agriculture (CIAT) with financial support from the Rockefeller Foundation in 1997. In its first phase (1997-1999), the objectives of the PRIAM program have been to:

- implement community-based participatory research projects in several countries in Eastern Africa in collaboration with National Agricultural Research Organizations (NARIs), Ministries of Agriculture (MoAs), Departments of Extension, and Non-Governmental Organizations (NGOs);
- facilitate the institutionalization of participatory research approaches within collaborating NARIs, MoAs, Extension, and NGOs; and
- refine and develop methods for different stages of the participatory research process, including, 1. Characterization and Diagnosis, 2. Planning and Experimentation, 3. Monitoring and Evaluation, 4. Information and Technology Dissemination, and, 5. Analysis of Experience.

The PRIAM program is currently working with national and regional agricultural research institutions in four communities in Central and Eastern Ethiopia (in addition to sites elsewhere in Eastern Africa) and entering into its fourth year with more diversified sources of funding through the Eastern and Central Africa Bean Research Network (ECABREN). Funding by the International Development Research Center (IDRC, Canada), for the supporting research activity reported here was for the purposes of analyzing and documenting the research and extension experiences of participating communities and research institutions and supporting continuing activities within the PRIAM project in Ethiopia. This joint research project with the Ethiopian Agricultural Research Organization (EARO), had the objective of assessing the process of developing community-based participatory research with a particular emphasis on understanding farmers' response to the project, their own experimentation and diffusion of new technologies. This research activity is meant to verify and demonstrate the utility of the PRIAM approach and to provide valuable information on farmer experimentation and diffusion mechanisms to several target groups -- including PRIAM teams in six countries and a wider audience of researchers involved in community-based participatory research in Africa.

Specific Objectives of the Study

The specific objectives of this supporting research activity with EARO have been to:

- assess farmers' capacity to analyze their experiences with new technologies and processes connected with Participatory Technology Development;

- investigate and analyze the multiple ways in which farmers experiment with and adapt new technologies and assess how the PRIAM approach supports farmer experimentation;

- examine the factors that contribute to problems and successes in the functioning of Farmer Research Groups;

- analyze the implications of class and gender differences for participation in participatory research activities, farmer experimentation and technology diffusion;

- examine the social relations, networks, and institutions through which farmers donate, exchange, loan and sell new technologies to other farmers within and across communities.

The research work focused primarily on the PRIAM sites at Boffa and Wolencheti under the management of the Melkassa Agricultural Research Center although field visits were also made to the PRIAM sites at Ararso managed by the Alemaya University of Agriculture (AUA) and at Surakoyo managed by the Awassa Regional Research Center, and to the participatory research site at Gununo managed by the Areka Regional Research Center under the auspices of the African Highlands Initiative (AHI).

Research Methodology

To explore the experiences of farmers and researchers with the participatory research process in the context of the PRIAM project the methodology involved a primarily qualitative research approach. This approach drew on a diversity of qualitative social science research methods as a way of examining a range of issues and themes associated with the participatory research process.

Focus Group Discussions provided an initial introduction to the farmers participating in the PRIAM project at the Boffa and Wolencheti sites and to the experiences of farmers within the participatory research process. Group discussions were organized to examine many of the social, cultural and economic dimensions of the farming system and household livelihoods. The discussions explored, in substantial depth, the dynamics and meaning of local social relations (such as gender, class and kinship relations) both within and across households and communities, and how such relations shape the farming system and the ways in which farmers negotiate and secure access to productive resources (such as land and labour), and new agricultural technologies.

Semi-structured interviews with PRIAM farmers formed the basis of the qualitative research approach. Interviews were carried out with PRIAM farmers at the Boffa and Wolencheti project sites, and to a more limited extent with PRIAM farmers at Ararso (AUA), Surakoyo (Awassa), and Gununo (Areka). Semi-structured interviews were utilized to examine a diversity of issues including background to the on-farm experimentation process, the impact of new technologies on the farming system, household livelihoods, and household and community relations, the social networks and institutions in which different farmers participate and invest and how such relations provide local channels of information and technology diffusion.

Farmer Research Group Self-Evaluations were developed to enable farmers at Boffa and Wolencheti to analyze their own experiences as FRG members (and participants in the PRIAM project) and to evaluate the strengths and weaknesses experienced FRGs within the participatory research process. FRG self-evaluations began with FRG members discussing and documenting the objectives of the group as they understood them. Objectives of the FRGs included conducting on-farm research with new technologies, monitoring and evaluation of on-farm trials and the

reporting of trial results to PRIAM researchers, disseminating information and project technologies farmers outside the formal research process (distributing the benefits of research to the community), and catalyzing community development by acting as a bridge between PRIAM researchers and the community. A standard logframe was modified and used as a participatory evaluation tool to then enable farmers to analyze their ability to meet group objectives (activities organized, constraints encountered, etc.) and to identify potential strategies to better enable the FRG to meet its objectives in the future. Following the completion of the logframe by group members, other issues related to the functioning and performance of the FRG were identified and discussed. Farmers evaluated the effectiveness and efficiency of the group's leadership (including the FRG chairman and committee), the cohesiveness and problem-solving capacities of the group, the benefits and drawbacks of group formation and action, the relationship between the FRG and PRIAM researchers and the relationship between the FRG and the community. The evaluation was concluded with a discussion of what each member, and the group as a collective, envisioned for the future in terms of the potential role of the FRG in research and community-based development. Using the same participatory logframe evaluation tool as a starting point for discussion, evaluations of FRG activities and performance were also conducted with non-participating farmers, that is, community members outside of the formal participatory research process. PRIAM researchers were interested in the experiences and perceptions of non-participating farmers/community members and how they would evaluate their local Farmer Research Group in terms of FRG effectiveness and the extent to which such groups have met their objectives (e.g. to disseminate information and technologies to community members etc.). It was hoped that including community members in the evaluation exercise would provide useful information about FRG-community relations and potential ways of improving participatory research processes. More than anything, the inclusion of non-participating farmers in the evaluation process was meant to encourage community participation and the sharing of experience.

Wealth ranking exercises were conducted to examine local concepts and categories of wealth and were later modified to assess the impact of the PRIAM approach, and new project technologies more specifically, on the wealth of PRIAM farmers in relation to community members outside the formal PRIAM process over time and on the changing relations of power between rich and poor within participating communities in the context of PRIAM.

In the latter stages of the research, a technology diffusion mapping exercise was organized to trace, and map out, the social relationships, networks, and institutions through which PRIAM farmers donate, exchange, loan and sell new technologies to other farmers locally and within neighboring communities and woredas (districts). Before the mapping of farmers' social relationships and membership in local social institutions began, farmers were asked to complete a brief questionnaire. The questionnaire was utilized to collect and organize information regarding the types of technologies different PRIAM farmers have tested, the seasons they began experimenting with each technology, the names of the farmers with which PRIAM farmers shared technologies, their relationship to said farmers (e.g. extended family relation, friend, neighbor, exchange labour group member, funeral group member, etc.), the community in which each receiving farmer lives, the years that they shared each technology with each person, the quantity of the technology shared (in the case of seed), and the basis of exchange (donation, exchange, loan, sale). Using a large piece of paper and markers of several different colours, farmers then proceeded to map out spatially all of the social relationships through which they shared a range of technologies under PRIAM.

Participatory Technology Development Put Into Practice

Participatory Technology Development (PTD) may be defined as research and development-oriented activities aimed at, or resulting in, a change in an existing technology in a direction considered desirable by the different users of that technology (in our case mainly farmers) and which are carried out by networks in which the users of the technology play an active role (Engel

1991:9). The PTD process brings together the knowledge and research capacity of farmers and their communities with that of scientific research institutions in an interactive and collaborative way in the identification, generation, testing, application and diffusion of new technologies and practices (ibid). In PTD, unlike earlier participatory research paradigms (such as Farm Systems Research), participation implies that farmers can, to a significant extent, identify and implement their own solutions to meet their specific needs. In PTD, research activities are chosen based on their relevance to, and the interest of, different farmers and build upon farmers' own knowledge of the farming system and experience with local technologies (Haverkort 1991:6). As such, the role of researchers within PTD is less to direct or control the research agenda than to support the interests and initiatives of farmers. The goal of PTD is therefore not only to develop locally adapted improved technologies but also to improve the experimental capacities of farmers, and to empower social groups to gain greater access to and control over resources and decision-making within development research as a means of ensuring that such research is sustainable.

The Participatory Technology Development Process Under PRIAM

The PTD process in the PRIAM communities around Nazreth began with the building of relationships of cooperation between PRIAM researchers from Melkassa Research Center, district-level Development Agents (DAs), and farmers from participating communities as the core PTD network. As a starting point, relationships were also built between PRIAM farmers through the formation of Farmer Research Groups in participating communities. As will be discussed in a later section of the report, however, the role of the community, and protocols for community participation, in the PTD process were not defined at this stage of the project's development. In other words, "the community", as such, was not an active participant/actor in the PTD network.

Farmer Research Groups (FRGs) were formed at the initial stage of the PTD process by PRIAM researchers and DAs at each project site. FRG members were selected based on their interest and willingness to participate in on-farm research and, to a lesser extent, their ability to participate in terms of resource access (land, labour, etc.). There was no attempt to identify and include different categories of farmers - or user groups - (based on wealth and other social and economic axes of difference), in the FRG at the time of group formation. The purpose of establishing FRGs within participating communities was to facilitate the PTD process at the community level. FRGs are expected to act as the focal point of on-farm experimentation, monitoring and evaluation of on-farm trials, and information and technology dissemination within the community. The formation of FRGs was also seen to have the potential to build the capacity of farmers to influence research agendas and act collectively through the development or consolidation of community networks.

The research process began with activities aimed at developing, with farmers, an agro-ecological profile of the project sites (including soil types, rainfall patterns, cropping system, and indigenous technical knowledge of local agro-ecology etc.). Little effort, however, was put into enhancing researcher understanding of the social and cultural dimensions of farmer livelihoods and community/social organization (due to a lack of social science experience and expertise at Melkassa Research Center). This was followed by a series of discussions between PRIAM researchers and farmers to identify and prioritize farmers' problems and research interests. The problems identified and prioritized by PRIAM farmers included the following:

Problems identified and prioritized[1]	Potential innovations/technologies identified
1. soil moisture stress	-improved moisture-conserving farm implements -short cycle varieties -moisture-harvesting tillage practices
2. poor availability of high yielding and different maturing classes of varieties	-testing of different varieties suited to local agro-ecological conditions
3. poor soil fertility	-crop rotation -farm yard manure and inorganic fertilizer -compost
4. weeds	-improved tillage practices -use of inter-row weeder -herbicides
5. livestock health problems	-use of, and research into, indigenous herbal medicines -veterinary services
6. lack of portable water	-development of water resources such as deep wells and ponds
7. soil erosion	-contour plowing -tie ridging -terracing -afforestation
8. poor availability and high cost of fertilizer	-subsidies -use of farm yard manure and compost -crop rotation
9. pests and diseases	-use of botanical plants which have pesticidal properties -storage hygiene -mixing of other crops with teff -use of pesticides
10. shortage of cultivatable land	-renting land -inter-cropping sharing available land (common lands)
11. poor availability and high cost of pesticides	-subsidies -use f botanicals -crop rotation
12. shortage of animal feed	-testing different forage legumes and multi-purpose fodder trees

On-farm Experimentation With New Technologies Under PRIAM

Based on farmers' identification and prioritization of researchable problems, and the technical expertise of PRIAM researchers, farmers have engaged in a diversity of on-farm experimentation through which they have tested (and continue to test) the performance of improved varieties, cropping methods, and agricultural implements with that of local counterpart technologies.

PRIAM researchers and farmers have worked in collaboration to plan, design and implement on-farm trials and monitoring and evaluation protocols that would meet the needs and interests of both parties. In most cases, PRIAM farmers design experiments to compare the performance of new technologies with that of a local/existing technology, where the local technology acts as a control. PRIAM farmers typically experiment a new technology over multiple seasons to analyze the performance of that technology under changing (or variable) climatic conditions.

Over the last four years, experimenting farmers at PRIAM sites in Ethiopia, have implemented variety trials on teff, maize, beans, sorghum, wheat, barley, sweet potato, and Irish potato that

[1] Table adapted from Adugna, W. and A. Tesfaye (1999).

compare the performance of local varieties with improved varieties released through agricultural research centers in Ethiopia and elsewhere in East Africa. After three years of variety trials, and based on their own criteria, farmers have selected varieties with various characteristics including early maturity, drought and/or heavy rain tolerance, high yield, resistance to pests, and a desirable appearance and taste. Although in most cases one or more of the improved varieties for each crop were selected for future use, at one of the Nazreth project sites, Wolencheti, three local varieties of teff – discovered through eleven years of intensive seed selection by a local farmer – have also gained considerable popularity and are being tested in the fields of other local farmers. Selected varieties are now being multiplied by a number of PRIAM farmers at the project sites and shared with farmers within the community and neighboring villages.

In addition to variety trials, PRIAM farmers in the Ararso Peasant Association (with AUA) are implementing on-farm experiments to address soil fertility management issues (composting, use of farm-yard manure, intercropping with nitrogen-fixing legumes, multipurpose forage and pasture crops, multipurpose trees); crop protection/pest management (testing Lantana, Datura, carbofuran insecticide and pepper tree to control sorghum stalk borer); livestock health (veterinary services and livestock monitoring, multipurpose forage and pasture crops to improve quality of livestock feeds); and reforestation (dissemination of *Leucaena leucocephala*, *Sesbania sesban*, and *Eucalyptus saligna* seedlings). Compared to other PRIAM sites in Ethiopia, the AUA has experienced the greatest success in implementing an integrated approach to participatory research despite the fact that it does not have a functioning multidisciplinary team.

By far one of the most impressive series of on-farm experiments are those designed to test the performance of improved agricultural implements developed by researchers from the National Agricultural Mechanization Research Center (NAMREC) at the Melkassa Agricultural Research Center in collaboration with farmers from the two participating communities near Nazreth. Since 1996, farmers at the two Nazreth project sites have performed on-farm trials to test and compare the performance of five different agricultural implements with the indigenous *maresha* on-drawn wooden plough. The most interesting and impressive aspect of the development of these technologies is that they have been designed as attachments to, rather than replacements for, the *maresha*.

The Moldboard Plough, for example, was designed to cut deeper into, and invert, the soil and has been found by farmers to improve the infiltration of water into the soil, enable deeper root penetration and nutrient uptake, control weeds, and incorporate crop residues into the soil thereby dramatically increasing soil fertility. Through on-farm experimentation, use of the moldboard plough has been found to increase grain yield by 50-100 percent.

The Winged Plough is designed to plough a farmer's field without inverting the soil and, thus, reduces soil moisture loss to evaporation. Farmers in dry areas have found this implement useful for moisture conservation through *Nish Kebera* (an indigenous water harvesting technique).

Compared to manual weeding, the Inter-row Weeder dramatically reduces the time and labour required for regular weeding activities, provided that row planting is also practiced (the traditional system is broadcast seeding). Given that women, to varying degrees play a role in weeding planted fields, the introduction of the weeder may have long-term impacts on the gender division of farm labour, and in turn, the extent to which women play a role in decision-making in farm management and can make claims to a portion of farm income in return for the contribution of their labour. One of the greatest benefits of both the winged plough and the inter-row weeder is that they require significantly less draft power and can be pulled by a single ox or pair of donkeys. This is an incredibly valuable feature given that the shortage of oxen and oxen feed are major production constraints in the area. A farmer from Wolencheti, if fact, modified the conventional oxen yoke to harness donkeys.

The Tie-ridger forms a series of basins to check run-off and improve rainfall infiltration in cultivated fields thereby increasing soil moisture and reducing soil erosion and nutrient loss.

According to experimenting farmers, the Row Planter saves time and labour, more evenly distributes and conserves seed and fertilizer, and has been found to be exceptionally useful in the intercropping of beans or forage crops in maize or sorghum fields. Using the row planter, farmers in participating communities have also been experimenting with the comparative benefits of open and closed furrow planting under different rainfall conditions. Farmers have opted to experiment with different implements depending on the types of crops grown, the local soil type, the specific production constraints experienced, and the specific practices, preferences, and interests of individual farmers.

On-farm experimentation of new agricultural implements has met with remarkable success in participating communities largely because the implements have been developed and designed as attachments to the indigenous *maresha* plough used by farmers throughout Ethiopia for centuries. The experience of farmers and researchers alike has been that the development of the new implements which are derived from indigenous farm implements and practices simplifies the training required by farmers to operate and test the implements on-farm and makes possible the dissemination of new information, skills, and *maresha*-based technologies from farmer to farmer. Based on the indigenous *maresha*, these technologies are more readily accepted and adopted by farmers both because they are familiar (farmers already have considerable experience with and knowledge of the operation, maintenance, and performance of the *maresha*), relatively low cost, and because they save labour time, conserve seed, and dramatically improve farmers' yields.

Over the course of the experimentation process, the implement technologies, in particular, have gone through several stages of development based on farmers' experiences with the technologies on farm and the feedback given to PRIAM researchers on how such technologies may be improved to better meet farmers' needs and interests. The indigenous knowledge of PRIAM farmers related to the local climate, the nature and characteristics of their soils, the growth behavior of locally used crops, and the indigenous maresha plough has made important contributions to the development of the implements and, more specifically, how they are used (i.e. farming practices) on-farm. The next section presents the development of the row planter as a detailed case study in order to examine the "process" of participatory technology development in-depth.

PTD Case Study: The Development of the Row Planter

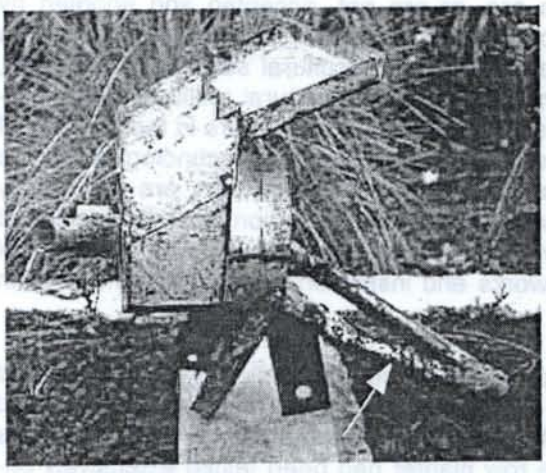
In order to understand why it is that technologies are, or are not, accepted and adopted by farmers it is critical to examine the processes through which technologies are developed. It is often the case that agricultural technologies are developed by agricultural scientists, on-station, with little consideration of the agro-ecological, economic, social and cultural realities of the end-users, in our case small-scale farmers, and little, if any, participation by farmers in the process of technology development. The result, in many cases, is the development of technologies that do not address the needs and interests of farmers and which, for the most part, are not readily adopted. This case study demonstrates the importance of farmer participation in all dimensions of the technology development process to not only improve the acceptability and adoption of technologies but build the capacity of farmers' networks and institutions to develop and sustain their own research and development agendas.

In 1995, engineers from NAMREC at Melkassa Agricultural Research Station (MARC) designed the first row planter. The row planter, as discussed earlier, is an agricultural implement designed as an attachment to the indigenous *maresha* plough to enable farmers to plough and plant crops in rows (as opposed to broadcasting). Although the row planter had been tested extensively on-station, the PRIAM project gave researchers the opportunity and support to collaborate with farmers in the area to test, and further develop, the technology under farmers' field conditions and livelihood constraints.

The original row planter was first brought to the farmer's field in 1996 after a farmer from the Wolencheti Peasant Association had expressed interest in testing the technology following a visit to Melkassa Research Center to observe the new technologies in development at MARC. As the original row planter was designed for local sorghum and maize varieties (each crop has its own seed distribution plate based on seed size and application rate) the farmer began by experimenting with the row planter to sow local sorghum and maize that season. Throughout the crop season researchers spent considerable time with the farmer observing and evaluating the performance of the row planter in the farmer's field. At the end of the first season, the experimenting farmer gave considerable feedback to researchers including the request that researchers develop a new seed distribution plate for *Fandisha*, a "popcorn" variety of maize (the seed size of *Fandisha* is smaller than local maize and larger than local sorghum, and thus, required a new seed plate for optimum seed distribution). In the same season, researchers developed a seed distribution plate for *Fandisha* that was quickly tested and approved by farmers.

In the same season, the experimenting farmer experienced a serious problem in the operation of the row planter that would demand researcher attention. During the planting of both sorghum and maize, the farmer reported that the fertilizer distribution outlets, positioned in the front of the implement to distribute fertilizer ahead of seed (positioned at the back of the planter), were being consistently clogged with mud as the planter moved through the soil. In 1997, this finding was confirmed by the majority of PRIAM farmers who found that the fertilizer distribution outlets were being clogged with mud during the operation of the planter causing the release and application of fertilizer below optimal levels and thereby affecting overall crop quality and yield. In 1997, PRIAM farmers recommended that the design of the planter be modified to overcome this shortcoming. In the same year, and in response to farmers' feedback, PRIAM researchers redesigned the row planter. On the original row planter, there were two fertilizer distribution outlets located at the front of the implement and two seed distribution outlets located at the rear. To reduce mud clogging, researchers modified the planter by reducing the number of seed and fertilizer distribution outlets from two to one (for each) and moving the fertilizer distribution outlet from the front of the implement to a position alongside the seed distribution outlet in the back of the planter (Figure 1).

Figure 1 Modifications Made to Row Planter to Avoid the Clogging of Mud in the Fertilizer Distribution Outlets



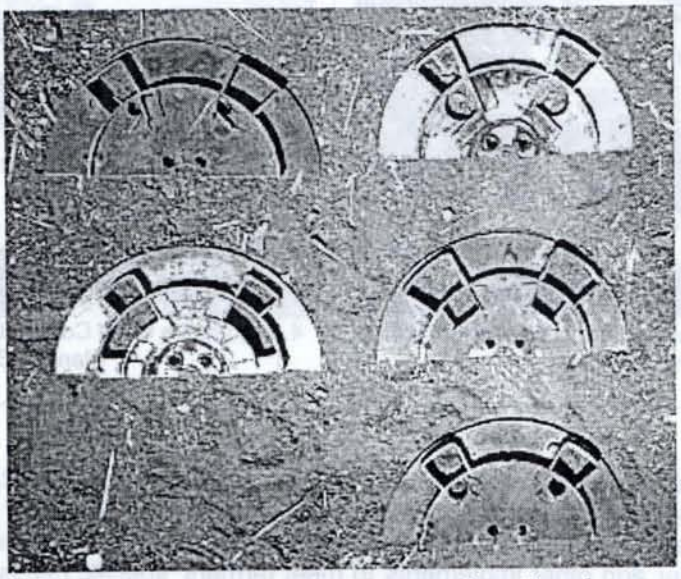
1. Original Row Planter
Fertilizer distribution outlets at the front of the row planter (right side of slide).

2. Adaptation of Row Planter
Fertilizer distribution outlet moved to the back of the implement - behind the plough and alongside the seed distribution outlet.

In 1997, the modified row planter was taken back to PRIAM farmers for continued experimentation. All PRIAM farmers reported that the modifications made by researchers dramatically reduced the clogging of mud in the distribution outlets of the planter, allowing the optimal distribution of both seed and fertilizer on the farm. It is crucial to note that during on-station testing of the row planter, researchers had not encountered problems associated with the clogging of mud within the fertilizer distribution outlets because they were testing the planter on sandy soil types with properties very different from the heavy "shakete" clay soils found in the Wolencheti area. Moreover, researchers were using a modified version of the indigenous maresha plough (unlike that used by farmers in the area) to test the row planter on-station which, again, accounted for results unlike those experienced in farmers' fields. According to the PRIAM researcher responsible for the development of the row planter, the participation of farmers in the technology development process has produced new adaptations of the row planter that are more locally appropriate than its predecessor.

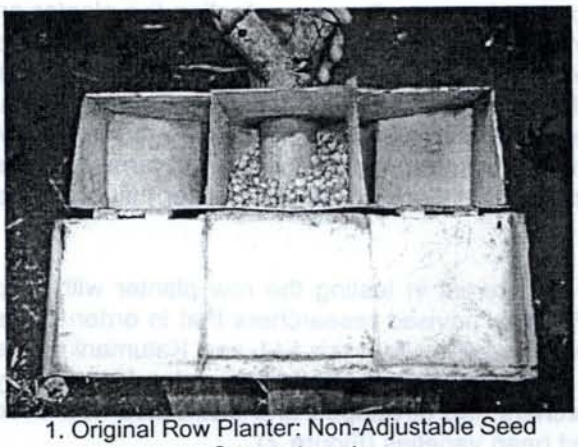
At the end of 1997, PRIAM farmers expressed an interest in testing the row planter with crop varieties under experimentation within PRIAM. Farmers advised researchers that in order to use the row planter with new maize and bean varieties (such as Awassa 511 and Katumani maize varieties, and Awash 1 bean variety) they would require new seed distribution plates for each. By the beginning of the 1998 *maher* season, researchers had developed and distributed new seed distribution plates for multiple improved maize and bean varieties (Figure 2).

Figure 2 Modifications Made to The Row Planter: Development of Multiple Seed Distribution Plates To Facilitate the Planting of Multiple Crops/Varieties

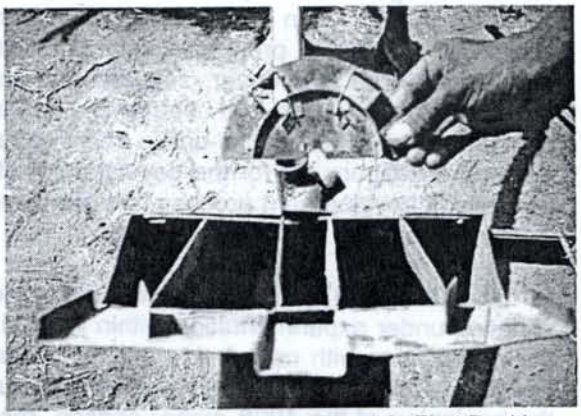


During field discussions between researchers and farmers it was decided, however, that the entire seed distribution mechanism of the row planter would need to be redesigned to enable farmers to use the implement for the planting of bean. According to experimenting farmers, the hopper, or seed compartment, of the row planter was too small for bean seed, given that the rate of bean seed application was much higher than that of maize and sorghum. As a result, farmers expressed concern that the seed compartment would become exhausted too quickly -- and so would require greater labour in the refilling of the seed compartment -- during the planting of bean. In response to these concerns and recommendations, PRIAM researchers re-designed the seed distribution mechanism in the row planter to make it adaptable to bean (and other kinds of seed with different seed application rates) by developing adjustable seed/fertilizer distribution compartments. Today, farmers can manually adjust the size of the distribution compartments to accommodate a diversity of crops and varieties (Figure 3). The ability to plant beans in rows has recently led to an increasing interest in, and experimentation with, the intercropping of bean with maize, a system not formerly known in this area.

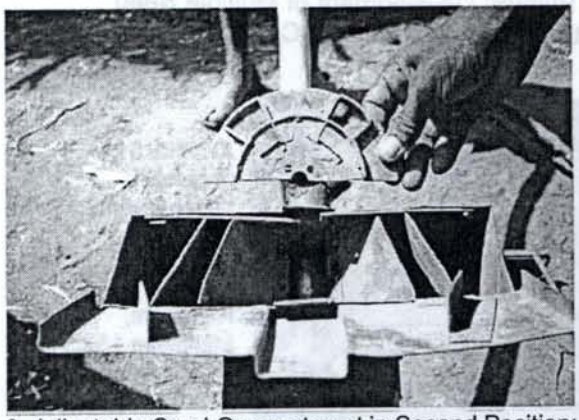
Figure 3 Modifications Made to Row Planter: Adjustable Seed Compartments to Enable Farmers to Plant Different Crops and Varieties



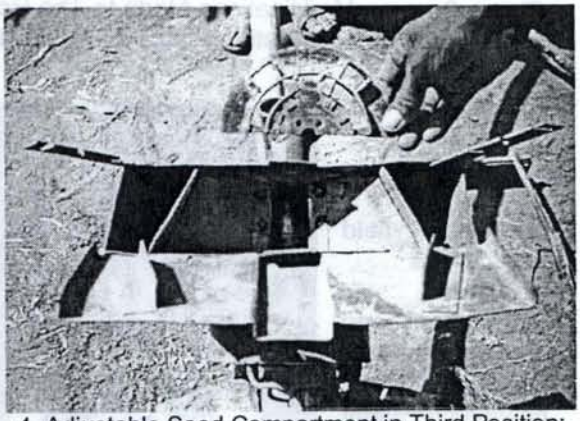
1. Original Row Planter: Non-Adjustable Seed Compartments



2. Adjustable Seed Compartment in First Position: Planting Sorghum



3. Adjustable Seed Compartment in Second Position: Planting Maize



4. Adjustable Seed Compartment in Third Position: Planting Bean

Based on these and other on-farm experiences and recommendations by PRIAM farmers, each of the improved agricultural implements has gone through several stages of development over the last four project years. Farmers and researchers continue to work collaboratively to adapt and improve the row planter and other implements to meet farmers' specific needs and interests. For example, researchers are now considering the possibility of changing the material from which the row planter is made from metal to plastic in order to lower its cost for farmers. Experiments are also being conducted by farmers to examine the feasibility of camel-drawn traction with the *maresha* plough in conjunction with new agricultural implements.

Once again, according to PRIAM researchers, had the experiences and indigenous knowledge of farmers not been identified and integrated into research such technological improvements to the row planter would not have been realized. The participatory technology development at the Nazreth sites has been an iterative process that has depended upon a strong sense of collaboration and exchange of ideas and expertise between researcher and farmer. According to PRIAM farmers, researchers have treated farmers as partners in technology development by taking the recommendations of farmers and developing implements that reflect their changing

needs and interests. The participatory technology development process, according to researchers and farmers alike, demonstrates that the best solutions in technology development often come from farmers who have first hand experience with the field operation and maintenance of implements. This process has, in turn, resulted in the development of technologies that are more appropriate and adaptive to local agro-ecological and production systems, and hence more sustainable than the standardized, and highly mechanized, farming technologies.

The Impact of New Technologies on the Social and Economic Lives of PRIAM Farmers and Households

Interviews with PRIAM farmers have revealed a number of economic and social impacts of involvement in the participatory research process and, more specifically, access to and experimentation with new technologies. Wealth ranking exercises in September and October 1999 provided considerable quantitative information regarding the impact of the participatory research process on the wealth and livelihoods of PRIAM farmers. During wealth ranking exercises in Worka (Wolencheti Peasant Association) and Kachachule (Boffa Peasant Association) villages, respondents were asked to rank all village members into locally defined categories of wealth. Once the rankings were completed, respondents were instructed to locate all PRIAM farmers within each wealth category. Respondents were then asked to rank PRIAM farmers again, this time based on their position within local wealth categories in 1996 – before the introduction of the PRIAM project (and new project technologies). According to the results of the wealth ranking exercises, between the years 1996 and 1999 most PRIAM farmers have jumped, on average, two wealth categories out of five. In Worka village, for example, 83% of PRIAM farmers shifted at least one wealth category with 67% of those jumping two or more wealth groupings in only three seasons. Both participating and non-participating farmers report that, as a result of on-farm experimentation with new technologies, PRIAM farmers have been able to dramatically increase crop yields and seasonal incomes. With this additional farm income, PRIAM farmers have been able to purchase more oxen, increase their landholdings, increase their level of investment in farm production (purchase of inputs etc.), improve household food security and overall household livelihoods. The new wealth and status of PRIAM farmers has resulted in new categories and concepts of wealth defined on the basis of participation and access to technology under PRIAM and in growing disparities between rich and poor within the community. PRIAM farmers share a distinct social and economic status vis-à-vis other community members not only because they are now wealthier than most of their neighbors, but as a group they have strong relationships with PRIAM researchers, local extension agents, and NGOs active in the community which elevates the social and political status of PRIAM farmers setting them apart from the body of their community.

The often dramatic increases in household wealth created by new project technologies raises several questions about the impact of new income levels on domestic budgeting arrangements and intra-household social/gender relations. During an interview with the wife of a PRIAM farmer in Wolencheti, it was clear that higher farm incomes under PRIAM did not have a wholly positive impact on the household. In households in Wolencheti and Boffa women, as wives, do not have the power to control or allocate farm income and in most cases do not generate an income of their own. Instead, women are given small allowances derived from farm income from their husbands or are permitted to take and sell small amounts of grain to purchase food and supplies for the household. Increases in farm incomes have produced new demands by wives for greater amounts of money to meet the needs of the household. In most cases, women request only the same percentage of farm incomes they had received in the past. However, in some cases such requests can produce conflict between husbands and wives. One wife, for example, claims that her husband refuses to increase her household allowance despite the dramatic increase in his farm income and increased investment in farm production over the last three seasons. In reaction to her husband's refusal, she regularly pilfers grain from the household silos and sells it at local markets to secure the money necessary to improve household food security and livelihoods. In some cases, therefore, increased farm incomes may escalate conjugal conflict over domestic

budgeting arrangements and, more positively, give rise to a renegotiation of gender resource rights and responsibilities within the household.

While it is clear that increased farm incomes may produce an escalation of gender conflict over domestic budgeting in some households, it is difficult to determine the extent to which this is likely to be a trend within PRIAM communities in Ethiopia. In Wolencheti and Boffa it is difficult to discuss with women issues related to household income and domestic budgeting and the relationship between husbands and wives, as their husbands are typically present during interviews. In such situations women commonly refer to social norms rather than the specific experiences of their households and would not speak negatively about their husbands. When sensitive questions are asked, husbands tend to take over the interview process and redirect the discussion. This certainly reflects the way in which gender relations of power shape the interview process and the kinds of results documented.

The way in which husbands and wives struggle over and renegotiate household budgetary responsibilities – how decisions about the allocation of income are made, how additional income is used, and who has the right to access and control such income – may have particular implications for communities (and PRIAM sites) where both women and men are actively engaged in agriculture, as in Kenya and Uganda but in marked contrast to most of Ethiopia. Such potential impacts need to be examined by researchers during local monitoring and evaluation activities, although considerable time must be given toward developing trust and familiarity between researchers, farmers, and other household members.

Farmer Research Groups in the Participatory Research Process

Farmer Research Groups (FRGs) were formed in 1997, under PRIAM, to coordinate the participatory research activities in participating communities and to act as a linkage between PRIAM researchers and the community (inspired by the CIAL approach in Latin America, see Ashby et al. 1995). According to researchers and farmers, the objectives of the FRGs are to:

- conduct on-farm research with new technologies,
- facilitate researcher/farmer contacts,
- monitor and evaluate on-farm trials and report the results of on-farm experimentation to PRIAM researchers on the basis of consensus,
- disseminate information and skills (through farmer-to-farmer training) to community members outside the formal research process,
- disseminate project technologies to community members outside the formal research process (distributing the benefits of research to the community), and
- catalyze community development initiatives.

Essentially, the FRGs are the center or focal point of PRIAM research activities at village level. As members of the FRGs, participating farmers are responsible not only for on-farm experimentation but for a range of social / community-based activities (such as dissemination of information and technologies) where the FRG is seen a crucial linkage between PRIAM researchers and the whole of the community. As such, PRIAM researchers were interested to analyze - with PRIAM farmers - the functioning and performance of the FRGs in terms of their ability to meet group objectives, group leadership, cohesiveness, and problem-solving capacities, and their relationship with the formal research system and their community. It was hoped that information obtained through FRG self-evaluations would illustrate their effectiveness in, and contribution to, participatory research processes and provide lessons to other PRIAM project sites in the region working within and through FRGs.
Following preliminary group discussions in August 1999, a group meeting was organized with the Farmer Research Groups in Boffa and Wolencheti participating communities in January 2000 where the FRGs performed a group self-evaluation. The FRG self-evaluation exercises proved a crucial research activity to identify not only the strengths and achievements of the groups but to

recognize the difficulties encountered in the day-to-day activities and management of FRGs and the opportunities that FRGs present within the participatory research process. The evaluation exercises at both sites opened with a discussion of participants' experiences with, and thoughts on, the process of group formation, the benefits of establishing farmers' organizations, and an assessment of the group's leadership, cohesiveness and problem-solving capacities. This opening discussion framed the body of the evaluation in which farmers engaged in an analysis of the strengths and weaknesses of FRGs. Where necessary, the following analysis will distinguish between the accounts of the FRGs at the Boffa and Wolencheti project sites, as they have had very different experiences and display different capacities and levels of success as a group.

FRG Relations, Leadership, and Capacities

In order to understand the extent to which FRGs have realized their objectives and contributed to the participatory research process, it is useful to examine the functioning of such groups including group leadership and the social/power relations among its membership (group cohesiveness), the problem-solving capacities of the group, and the relationship between the FRG and the PTD network (PRIAM researchers and extension personnel).

In Wolencheti, the FRG has experienced measurable success in working as a group. Both PRIAM farmers and community members alike agree that the successes of the FRG in fulfilling its research and development objectives are due to the strong leadership provided by the FRG chairman, and the cohesiveness and problem-solving capacity of the collective. Having experienced the benefits of working as a team, relations between group members are impressively strong. FRG members appear to be highly invested in each other with a considerable amount of trust and cooperation among them. The FRG chairman and committee are committed to, and active participants in, the day-to-day activities of the FRG. In fact, the chairman of the FRG works not only within his own community to share information and his experience with new technologies, but travels to neighboring villages and towns to present his work (and the work of the FRG) at schools and during festivals and other national celebrations. The chairman's demonstrated commitment to the participatory research process has become a powerful symbol and catalyst for action within the FRG at Wolencheti. The leadership of the group is also very strong in terms of identifying and solving problems both among members and between the FRG and PRIAM researchers (and other stakeholders) with strength and fairness. With considerable trust and respect for the leadership of the FRG, members are well organized, and enjoy working together as a group to learn from one another and to develop new skills and research and development opportunities in their community.

The farmer evaluation exercises suggest that the FRG at Boffa, on the other hand, has experienced considerable difficulty functioning as a group and meeting their own research objectives. During the FRG evaluation exercise, members reported that the group suffers from poor leadership and group cohesiveness and lacks adequate problem-solving initiative and capacity. According to FRG members, struggles over access to and control over project resources have developed and gone unchecked within the FRG at Boffa due to the poor leadership and problem-solving capacities of the group and insufficient monitoring of group functioning (such as resource and technology sharing) by PRIAM researchers. The FRG does not meet regularly to share their experiences and to address problems within and beyond the group and, more than anything, do not demonstrate any level of social cohesiveness or group identity. Unfortunately, group membership does not appear to have contributed to the participatory research process in any observable way. During recent meetings with the FRG we have worked with members to identify potential strategies to improve group functioning. A small number of FRG members at Boffa have initiated several activities including the election of a new chairman and committee and a plan to hold monthly group meetings to organize research activities and to improve the problem-solving capacity of the group. Where FRG functioning is determined to be low, however, there is a need for regular and effective monitoring of FRG activities and group functioning by PRIAM researchers. Due to FRG problems at many of the PRIAM sites it was recommended at a recent PRIAM workshop that FRGs not be formed at the beginning of a

project but be catalyzed once the participatory research process has been established and accepted. The experiences of the FRG at Boffa reflect the need for the formation of farmers' organizations to be farmer-initiated and built upon local forms (or concepts) of social organization (e.g. identifying local social networks and institutions as entry points into a village and bringing farmers together through these local forms of social organization).

What is clear from the experiences of the FRGs at Boffa and Wolencheti is that strong and committed leadership and effective group functioning (a group that thinks of itself as, and works as, a group) are critical components of a successful Farmer Research Group and strengthen the participatory research process. In Wolencheti, PRIAM farmers report that the presence of the FRG has enhanced the quality of on-farm experimentation, the capacity of farmers to monitor and evaluate trials, and the ability of PRIAM farmers to communicate the results and benefits of research to others within and outside of the community. Further, PRIAM farmers insist that working through the FRG has greatly enhanced the relationship and degree of collaboration between experimenting farmers and PRIAM researchers. Through the FRG, researchers are able to organize research activities, disseminate and collect information quickly and easily to/from all members at one time, and develop new research ideas and initiatives in close collaboration with all experimenting farmers. As such, PRIAM farmers at Wolencheti argue that the presence of the FRG transforms the research process from a consultative to a more collaborative or collegial mode of farmer participation in agricultural research. Group organization has also greatly enhanced the negotiating power of farmers vis-à-vis the formal research and extension systems. As a farmer's organization recognized by the formal research and extension systems, FRG members claim to feel greater sense of confidence in their own experimentation skills and knowledge and are better able to make claims on the research and extension systems for desired technologies and to reject those technologies and packages which farmers find unacceptable.

To strengthen the capacity of FRGs within the participatory research process it is crucial that PRIAM researchers work closely with FRGs to develop a set of FRG rules and regulations defining the roles and responsibilities of group leaders and members, developing mechanisms for the monitoring and enforcement of FRG regulations, and improving group functioning and problem-solving capacities. This can be achieved through the organization of a site-specific, farmer-led capacity building workshop. At this stage in the PRIAM project such capacity building exercises would enable FRGs (such as the Wolencheti group) to assume new responsibilities within the participatory research process, including the monitoring or tracking of farmer-to-farmer technology diffusion and the scaling-up of the results of on-farm research.

FRG Self-Evaluation: Experimentation, Monitoring and Evaluation

The FRGs in both of the Nazreth project sites reported that they experienced moderate (Boffa) to overwhelming (Wolencheti) success in many of the technical aspects of their work, including the design, implementation, monitoring and evaluation of on-farm trials and the documentation and reporting of results to PRIAM researchers and extension personnel. The FRGs at both sites organized annual farmer field days to enable group members to work collectively to identify and solve problems in trial design and implementation, to improve experimentation practices, to monitor and evaluate the trials of all PRIAM farmers, and to decide, as a group, new research interests and opportunities for future on-farm experimentation. At the beginning and end of each season, the FRGs at both project sites come together at Melkassa Research Center to present and evaluate the results of on-farm experimentation to PRIAM researchers and to each other, and to plan future research initiatives. PRIAM farmers found the technical components of their mandate simple to understand and follow through due, in large part, to the active role PRIAM researchers have played in the majority of on-farm experimentation, monitoring and evaluation activities and the consistent level of support demonstrated by researchers for farmers' group initiatives.

"Hiding knowledge": FRG – Community Relations

The PRIAM approach, as defined and implemented by CIAT and its partner institutions, is a "community-based" research strategy. Within this community-based participatory research approach, the primary role of the FRG has been to act as a linkage, or bridge, between the PRIAM researchers and extension personnel and the whole of the community where the FRG is seen to represent the needs, interests, and ideals of their community. As such, FRGs are responsible for sharing information and technologies with community members outside of the formal research project, integrating the community into project decision-making, and facilitating research and development goals that are defined by the whole of the community. To assess the extent to which an FRG has worked within, through, and on behalf of their community, FRG evaluations were organized not only with FRG members but also with many non-participating community members. The outcome of the evaluations and the experiences of the FRGs suggest that many of the assumptions built into community-based participatory research approaches do not reflect the nature and complexity of farmers' social relations at the Nazreth project sites, and in turn, may not be the most appropriate unit of analysis and intervention in certain social and cultural contexts. This case study provides a useful set of lessons that will improve many of the activities surrounding the conceptualization, organization, and management of farmer's organizations within participatory research processes in the future.

There are several indicators of weak FRG-community relations in the Nazreth PRIAM sites. The first, and most obvious, indicator is the extent to which the FRG shares information and technologies specifically with community members. Under PRIAM's community-based approach, one of the primary responsibilities of the FRG is to share information and technology (the benefits of research) with farmers in their community. During the FRG evaluations PRIAM farmers and community members were found to have very different accounts of the performance of the FRG in disseminating project information, skills and technologies. One the one hand, farmers outside of the formal PRIAM project claim that FRG members have not shared the information, skills and technologies they have gained through project participation. Several community members at Boffa go so far as to argue that the FRG is systematically "hiding knowledge" from "their neighbors" and have failed to organize individual and community activities and events to share information and skills derived from the PRIAM project and from FRG collaboration with PRIAM researchers. The Boffa FRG is thought to be hoarding project resources and, in turn, the benefits of research defined in terms of improved farm incomes and access to resources. One the other hand, FRG members at both project sites claim that despite a serious shortage of project technologies (implements and seed) they share technologies with many of their close friends and family. This presented itself as a startling discrepancy that required further examination. In the course of analyzing patterns of technology dissemination we began to ask PRIAM farmers "who" they have shared technologies with and "where" the recipients of such technologies live. In both the Boffa and Wolencheti sites it was found that farmers are embedded within a complex network of social relations (based on kinship, friendship, etc.) across many communities and so FRG members share technologies with individuals and households often outside of their own community. In other words, at the Nazreth sites PRIAM farmers do not necessarily prioritize community-based relations and so do not necessarily share technologies with "their neighbors".

The extent to which Farmer Research Groups at Boffa and Wolencheti have struggled with the idea of integrating the community into project decision-making processes constitutes another indicator of poor FRG-community ties or relations. The FRGs have not consulted the community in any capacity at any stage of the project cycle as they do recognize the community as an actor, or partner, in the participatory research process. While at first the reluctance of FRGs to encourage community participation in the project may be seen as an attempt to manipulate or control the project and its resources, it rather reflects the extent to which people in the project area do not think, work, or organize themselves as a "community" in the context of their daily lives. According to PRIAM farmers and other community members, there are no community-based mechanisms or institutions that tie people together materially or symbolically to a village, and because of this there is a lack of social cohesiveness and trust among community members.

People in the project area belong to multiple and overlapping social networks that intersect within and cross many communities. As such, the FRGs have expressed difficulty conceptualizing "how", and more importantly "why", to implement a rigid community-based approach that does not reflect the social and cultural realities and complexities of their day-to-day lives.

Since the beginning of the PRIAM project there has also been no attempt by PRIAM researchers to develop protocols for community participation at either of the project sites. PRIAM researchers assumed that the community would derive benefits from the participatory research project through a sort of "trickle down" process by which community members would secure access to knowledge and technologies through their social relationships with FRG members. While in some cases community members have secured access to project technologies through their relations with FRG members, many community residents have been marginalized entirely from the participatory research project. Further, as PRIAM researchers themselves do not meet with non-participating farmers outside the formal research project, they were unaware that the project was having a negative impact on community relations.

As discussed above, FRG members in both the Wolencheti and Boffa project sites have dramatically increased their overall wealth as a result of access to project technologies that have improved farm yields and household income while the remainder of the community have not. In many ways, the PRIAM project has produced new categories of wealth and status at the community level where the FRG is now seen as a group of elite, progressive, and wealthy farmers - distinct and separate from the body of the community. The tension between a community-based approach and the complex nature of farmer's social networks has therefore produced multiple struggles over participation, rights to knowledge and access to technologies (and the benefits of research more generally) articulated by community members outside the formal research process in terms of growing inequalities in wealth and social status defined on the basis of participation in the PRIAM project. From this experience, one key question appears to be how to ensure that project processes are more equitable and transparent to all stakeholders. All stakeholders should be aware of their responsibilities within a project and their rights to project resources, and all stakeholders must be involved in project decision-making processes. Most importantly, we need to begin thinking beyond standardized "community-based" approaches (and externally-formed farmer's organizations) that often do not reflect the complex nature of local social relations to consider how existing social networks and institutions may provide the foundation for different kinds of research activities.

Community, Farmers' Networks, and Social Capital: Strengthening Participatory and Community-based Research Approaches

In order to understand the experiences of farmers and communities within participatory research processes (e.g. FRG-community relations) it is necessary to consider how such processes are shaped by the social, cultural, and political realities of rural peoples' lives. Farmer Research Group members under PRIAM have not failed to share information and technologies with fellow community because they are "bad" or "selfish" farmers, but because rural people in parts of Ethiopia do not think, act, or mobilize themselves on the basis of some sense of "community", nor do they necessarily prioritize community relations when they decide with whom they will share information, resources and technologies. As will be discussed in this section of the report, farmers' belong to, and invest in, social networks and institutions that are not defined in relation to a community, but that cross many neighboring villages and which shape local social relations and patterns of sharing between people. It is within and through such social networks that information and technologies are diffused. There may be a need, therefore, to rethink many of the assumptions built in to community-based participatory research approaches and to explore farmers' social networks and institutions as potential entry points for different kinds of research and development intervention. First though, it is necessary to examine why the concept of "community" does not reflect the nature of farmers' social relations at the project sites, and potentially elsewhere in Ethiopia.

Villagization and the Social Organization of Farmers in Wolencheti and Boffa Peasant Associations: Rethinking the Concept of "Community"

Exploring aspects of the political history of Ethiopia, one can begin to understand the dynamics of farmers' social relations and why the concept of community may not be the most appropriate unit of analysis of development research and intervention in certain social, cultural, and political contexts. Until very recently, farmers in many parts of rural Ethiopia did not live in what we commonly think of as "communities" and, in many ways, still do not. In the past, farmers in the project area (and in other parts of Ethiopia) lived in homesteads scattered and spread out over the countryside either singly or in clusters. Rural people typically maintained a household, or compound, in which immediate and several extended family members resided, with other extended family relations living in nearby homesteads. People's farms were typically adjacent to their homes and considered part of their homestead. According to local residents, prior to the Ethiopian revolution (1974) farmers lived with no discernable social and physical boundaries that organized rural people into spaces one would define as a "village" or "community". The concept of "community", when used, referred more to membership in one's kinship group through which rights to customary land were distributed to members of a given descent group and which acted as the basic unit of cooperation and mutual aid. In this sense, rural peoples in the project area did not belong to - or reside in - communities per se, but were embedded within complex systems of social relations including kinship relations and membership in many social networks and institutions (see below) which were, and are, not "community-based".

Since the Ethiopian revolution, land reform and villagization policies and programs were the foundation of government efforts to transform rural societies on the principles of agrarian socialism. Villagization became a nationwide program in 1985 when the government announced its intentions to move 33 million rural people from scattered dwellings into consolidated settlements, or villages, over a nine-year period (Lirenzo 1990). Within the social and political discourse of Mengistu Haile Mariam's regime, "the scattered and haphazard habitation and livelihood of Ethiopian Peasants cannot build socialism" (in Cohen et al. 1987), since "living in communities is a fundamental aspect of human progress" (in Birmeje 1988). One of the primary objectives of the villagization program, therefore, was to "enable" rural populations to develop the tradition and "sense of community" and self-help as a way of building self-reliance into rural peoples, and developing what the state viewed as pre-conditions for rural development – namely the development of infrastructural facilities and services (ibid). The concept of community, therefore, should be seen as an artificial construct imposed by the state on rural peoples in Ethiopia, rather than a natural or socially sanctioned form of social organization. Viewed in this way, the implementation of a "community-based" participatory research approach within this social and political context may become problematic, and highlights the importance of detailed analysis of social relations in rural societies to determine the most appropriate entry points and bases of intervention (be it the community, or specific social institutions etc.) for participatory research activities.

Farmer's Social Networks, Customary Institutions, and Social Capital: Examining Informal Technology Diffusion

After determining that "the community" is a problematic concept in relation to any examination of how information and technologies move from farmer to farmer at the PRIAM project sites at Wolencheti and Boffa, we took a step back and began to explore the kinds of social relationships, networks, and institutions through which farmers share information and donate, exchange, loan, and sell technologies to other farmers both within and across communities. The findings of the technology diffusion mapping exercises suggest that farmers invest and participate in multiple social networks and customary institutions through which they define and prioritize their relationships with others; and it is through these social relationships that farmers disseminate

information and technologies. The findings raise several interesting and timely questions about the concept of social capital – how it is defined, measured, and used within the context of participatory research approaches. The majority of recent literature related to social capital tends to operate on the implicit (and often explicit) assumption that social capital is to be found in "communities" - that communities either have or do not have varying levels of social capital. The reason for this has much to do with the integration of concepts of social capital into community-based approaches to research and development intervention. Where "communities" as such do not exist, is there necessarily no social capital between people? The most common definition of social capital in fact does not make specific reference to communities as all, but regards it as "features of social organization, such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit" (Putman 1993). Within the PRIAM project sites, "communities" as such may not have strong levels of social capital; however, rural people participate and invest in a diversity of social networks that are characterized by high levels of social trust and provide a social framework that makes coordination, cooperation and mutual assistance possible.

This section begins with a discussion and a description of the diversity of farmers' social networks, their meaning, and the ways in which such networks serve as channels of information and technology diffusion from farmer to farmer. Following this, the ways in which gender and age differences shape patterns of technology diffusion will be examined. This section then examines the concept of community and social capital in greater detail and considers new ways of thinking about social networks and institutions as entry points within participatory research and development initiatives in social and cultural contexts where community-based approaches are not necessarily appropriate.

Extended Family / Kinship Relations

Extended family, or kinship, relations are the most basic and meaningful units of social organization among rural peoples within the PRIAM communities around Nazreth. Kinship systems in the area are patrilocal (a woman moves to her husband's village and household upon marriage) and patrilineal (the transgenerational transmission of rights and property from father to son) where individuals maintain strong social and symbolic ties with relatives on their father's side. Extended family relations, according to informants, are the most fundamental units of mutual aid and social support among rural peoples in the area. Despite the dispersal of kinship members and households under the villagization program in Ethiopia in the 1980s (extended family relocated to different/neighboring villages within a district), rural people in the Nazreth area continue to maintain close relations with extended family members through which information, resources, property, and often technologies are shared. Some farmers suggest that in the context of villagization, extended family relations may have become even more socially and symbolically significant vis-à-vis other social institutions than they had been before. The relocation and settlement of farmers into artificial "villages" or "communities" caused rural people to be cautious of their neighbors and to invest more intensively in kinship networks that were based on a sense of history, "blood", and trust. Extended family are so crucial to an individual's social support network that these kin relations are often the basis of other social relationships and networks, such as resource-sharing groups, labour exchange groups, and rotating savings groups.

During the technology diffusion exercises that followed the experimental phase of varietal and agricultural implements development, PRIAM farmers were found to share information and technologies most commonly and consistently with extended family members (including brothers, uncles, fathers, mothers (if widowed), sisters' husbands, wives' fathers, etc.) as part of the extended family system of rights, responsibilities and obligations. In most cases, farmers prioritized extended family relations over all others when choosing with whom they would share limited resources and technologies. On average, at least twenty-five percent of the people with whom PRIAM farmers share technologies are extended family members who reside in the same, or often neighboring, village(s) within the *woreda*. The remaining 75% of technology sharing was

through different social ties maintained through participation in social networks and institutions at the community and inter-community levels.

Iddir and Baltina: Customary Funeral Institutions

With the exception of kinship relations, *iddir* is perhaps the most significant and meaningful of all customary institutions in the social lives of rural households. *Iddir* are mutual aid funeral associations responsible for providing material and social support to members following the death of a family member. The funeral ceremony in many parts of Ethiopia is often very expensive and can also be labour and resource intensive. Membership in *iddir* provides any member access to the financial resources required to organize and pay for the burial ceremony and to support their family during the mourning period. Male *iddir* members are responsible for planning and carrying out the burial preparation while women, as part of a *baltina* association (women's funeral association formally attached to *iddir*), are responsible for preparing the food and drink (and other household necessities including household wares etc.) for the mourning family and visitors over the 3-7 day funeral period.

Membership in *iddir* and *baltina* involves a number of financial and social obligations. As a member, one must make a small annual financial contribution, attend regular meetings, and contribute labour (and often other resources) to the preparation of funeral ceremonies for other *iddir* members and their families. Although extended family are sometimes members of the same *iddir*, it is more common, especially among extended family networks with sufficient financial resources, that individual households will join different *iddir* associations than that of other households within their extended family. Each *iddir* has limited resources that are replenished annually with the payment of membership contributions. If an extended family experiences the loss of more than one of their members in the same year, they can draw on the support and resources of several *iddir* associations to which their extended family belongs. Membership in multiple *iddir* is a clear livelihood strategy of diversifying a family's channels of access to financial and material resources during times of need, but must also be viewed as a deliberate process of "investing" in one's (or a household's) position and status in the social and political networks to which one belongs.

Neither *iddir* nor *baltina* are typically community-based social institutions. Most *iddir* and *baltina* groups in the project areas are composed of members from several neighboring communities within the same *woreda*. Households join *iddir* based on the social ties that one is interested to invest in and maintain, rather than the locality of the *iddir*. For example, a household head with close friends and associates in a particular *iddir* that is located in a village neighboring his/her own may be more likely to join this *iddir* than one dominated by his/her own community members with whom he/she has weaker ties.

According to women and men at the PRIAM sites, both *iddir* and *baltina* constitute significant channels through which project and technology-based information is shared. During regular meetings, and during the funeral ceremonies themselves, members discuss the project, the experiments of PRIAM farmers, and the technologies being tested. In many cases, PRIAM farmers reported that they shared technologies with *iddir* members who expressed interest after hearing about their benefits. As *iddir* is based on notions of mutual aid and cooperation, the sharing of technologies among *iddir* members is seen as reasonable by its membership.

Mhaber: Friendship Networks

Mhaber are voluntary fraternal associations consisting of fifteen to thirty or more friends (either male or female) who gather on holy days of the saints during each month[2], at a different member's house each time, to eat, drink and celebrate. Members are not seen as age-mates, kinsmen, or neighbors, simply friends (Lewis 1974). Mhaber members may or may not live in the same community, since many farmers invest in and maintain meaningful relationships with friends in many neighboring villages. Through *mhaber*, members agree to assist each other in times of need, including times of misfortune and celebration, and to regard each other as "brothers" or "sisters".

Since members of *mhaber* meet very regularly (usually 2-3 times per month) PRIAM farmers reported that such social occasions provided useful, and in many ways strategic, opportunities for farmers to share information about the project, the results of on-farm experimentation, and the technologies being used and to negotiate access to such technologies through their friendships with other members.

Jiggi / Dabo: Exchange Labour Groups

Jiggi and *Dabo* are associations of mutual assistance involving the exchange of labour for the completion of particularly demanding agricultural tasks such as weeding and harvesting. Although the way in which *jiggi* and *dabo* labour groups are organized and the obligations associated with membership may differ from place to place in Ethiopia, the overall meaning and utility of such networks are very similar (see Abate 1998). In the Wolencheti and Boffa participating communities a *jiggi* exchange labour group is initiated when a farmer calls between 5 and 12 of his relatives and close friends to contribute their labour and often tools to assist him on his farm. The "host" of the work party is obligated to provide traditional food including *injera*, and *wat* and often significant amounts of local drink known as *t'ala*. Typically the wife of the host (and other women family members) is responsible for the preparation and transport of food and drink for *jiggi* and *dabo* labour parties. In return for labour contributions on their own fields, *jiggi* members are obligated to provide their labour on the fields of each group member over the course of a given season. The membership of *jiggi* and *dabo* groups often shift over time as a given host calls a new work party at the beginning of each season. The flexibility of such groups enables farmers to work with those whom he trusts and whose labour contributions are observed to be reliable. At the Nazreth project sites farmers invest in *jiggi* groups composed almost exclusively of close relatives and friends whom they trust. At the Gununo (Areka, Southern Region) AHI project site however, participating farmers commonly formed *dabo* labour groups with close friends and not with extended family. Among Gununo farmers, contributing labour to the farm of a relative is a social obligation and does not require reciprocation – unlike *dabo*. As such, the inclusion of family members in *dabo* work parties often causes conflict over the extent to which a relative is required to provide reciprocal labour after his farm has been tended to. The ways in which membership in farmers' social networks changes over time reflects the flexibility and negotiability of such relations and the need to analyze the meaning of farmer's social networks in different cultural contexts.

Given the shortage of money many households experience during the course of the farm season, *jiggi* and *dabo* exchange labour groups provide farmers with access to large amounts of labour thereby reducing a farmer's dependence on hired labour. However, to call and participate in such a labour group is not only motivated by the job one wants done but also by the need for continuous investments in one's social network(s) (see Aspen 1993).

Jiggi and *dabo* labour groups constitute critical social networks responsible for the dissemination of information and technologies under PRIAM. Exchange labour enables members to observe

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[2] Men meet for *mbaher* on the twelfth day of each month (Ethiopian calendar) to commemorate St. Michael, on the nineteenth day to commemorate St. Gabriel, and on the twenty-third day to commemorate St. George, while women meet for *mhaber* on the twenty-first day of each month to commemorate St. Mary.

new technologies (varieties and implements) on-farm, to develop knowledge and skills regarding the use of technologies (e.g. new cropping practices with both varieties and implements), and to track the progress and performance of technologies over the course of a season, and often over multiple seasons. PRIAM farmers report that *jiggi* is one of the most important means of information and technology dissemination at the project sites.

Makanajo: Oxen-Sharing Relationships

Makanajo is a customary institution in which the single ox of one farmer is teamed with a single ox of another farmer for equal use alternately on each other's farms. This social relationship is critically important, and meaningful, among resource poor farmers who do not own, or have secure access to, sufficient oxen (at least one pair of oxen) to plough their land. Although farmers may enter into *makanajo* relationship with close relatives or friends from their own village, it is very common for farmers to engage in *makanajo* with relatives and friends from a neighboring community. *Makanajo* relationships are often established between two farmers who occupy adjacent or neighboring fields. Since the resettlement of farmers and the redistribution of land farmers' fields can be a considerable distance from their homes, farmers' fields are often closer in proximity to neighboring villages (than to their own) and to the fields of relatives and friends in neighboring villages. Again, such resource-sharing relationships are only developed between farmers who trust one another a great deal, since failure to secure access to a second ox often means that farmers are unable to plough their fields and obtain a harvest.

Like *jiggi* and *dabo*, *makanajo* relationships established and/or maintained between PRIAM farmers and farmers outside the formal research process provides a crucial opportunity for non-participating farmers to secure access to new technologies (such as the improved implements during ploughing) and to the technical knowledge of PRIAM farmers related to the operation and maintenance of such technologies. In fact, it seems that many non-participating farmers attempt to invest in *makanajo* relationships with PRIAM farmers as a means of securing access to technologies, which may represent a shift in the meaning and use of *makanajo* and how such relationships are negotiated between farmers in the future.

Equb: Rotating Savings Networks

Equb seems to be a common feature of rural as well as urban life in Ethiopia, as well as elsewhere in Africa. *Equb* is a means of saving small amounts of money on a regular basis, where the members meet weekly or monthly and contribute their pre-set parts. At each meeting, or at the end of each savings period, one of the members receives the period's amount (the combined contributions of all members). Although few if any farmers at the Nazreth research sites claimed to participate in *equb* (because of a history of *equb* members in the area running off with the contributions), several AHI farmers at the Gununo project site suggested that *equb* is a valuable social network for farmers interested in securing access to credit and is also used as a means of investing one's savings. Typically, farmers at Gununo participate in *equb* with close relatives and friends whom they completely trust. In many cases farmers enter into *equb* with their relations in neighboring villages in order limit the knowledge that neighbors and other community members have of one's earnings – yet another reason why farmers may strategically invest in social networks with people outside of their own community.

From this discussion one can see that rural people invest in a variety of social relationships, networks, and institutions through which they share information, resources, and technologies. These networks are not defined in terms of community but are fluid relationships that do not have fixed boundaries and meanings.

Gender, Wealth, and Age-Based Social Networks: How They Shape Patterns of Diffusion

Having identified and described the kinds of social relationships in which rural peoples in the project sites participate, it is important to recognize that all rural peoples do not participate in, or have access to, the same kinds of social institutions and networks. During our examination of farmers' social networks in Boffa and Wolencheti it was found that the kinds of social relationships that people participate and invest in, and the social spaces they occupy and use, in many cases depend on the individual's gender, wealth/class, and age. This, in turn, shapes patterns and processes of technology diffusion.

PRIAM farmers, and "farmers" more generally, are not a unified or undifferentiated category of people but rather represent different categories of wealth, age and (to a more limited extent in the case of the PRIAM farmers at Boffa and Wolencheti) gender. Although rural people interact within and across social categories and hierarchies, these categories often (although not exclusively) shape with whom an individual is likely to interact, work, share resources (and technologies), and who they are likely to trust in the context of their daily lives. For example, as discussed above, farmers typically enter into *makanajo* relationships with farmers of the same socio-economic status and resource constraints as themselves. The dissemination of information, skills and technologies through *makanajo* relationships has clear class dimensions and implications. Working through such relationships may constitute an effective strategy to ensure new technologies are reaching resource poor farmers.

Among both men and women in Boffa and Wolencheti age plays a significant role in the kinds of social relationships and networks to which people belong. Although men and women have friendships with individuals both older and younger than themselves it is common for people to have closest social ties with those of approximately the same age and at the same stage in the household lifecycle. This is best demonstrated by the limited extent to which older PRIAM farmers disseminated technologies to their friends. Very few farmers over the age of 45-50 years have shared technologies extensively. While this may in part be attributed to ill health and physical abilities, it has much more to do with the kinds of social networks that elderly men in the PRIAM sites maintain. When asked why they had shared technologies with so few people in comparison to other PRIAM farmers, elderly participants reported that they had discussed the technologies (implements and varieties) with many of their "friends" and had encouraged them to borrow and test the technologies on their own fields. However, according to these farmers, few if any of their friends requested to access or use the technologies for on-farm testing. While at first it seemed as though the informants might be untruthful (perhaps they had spoken to no one and had made no attempt to disseminate the technologies at all), these farmers had in fact gone to great lengths to encourage the diffusion of technologies. To understand why their friends had not requested access to the technologies we asked respondents about their "friends". Among elderly PRIAM farmers, close friends were typically adult males over the age of 50 years. Members of these friendship networks spend much of their time in local pubs within their community, in neighboring villages, and/or in local towns where they share information and maintain a relatively leisurely lifestyle. In both participating communities few farmers over the age of 50 (especially those with adult male children) continued to manage their own farms, opting instead to transfer their land to their sons as a form of pre-inheritance gift. However, as the household head, it was they and not their sons who participated in the PRIAM project in name, if not in practice. Since their friends no longer farm themselves few were interested in the improved technologies available and, so, did not request their use. In this way, age-based social networks play a significant role in shaping patterns of technology diffusion within the PRIAM project.

Similarly women and men also participate and invest in different kinds of gender-based social networks that to some extent shape patterns of diffusion. Men in the participating communities belong to a variety of social networks (whose membership is exclusively male) that fulfill a diversity of social functions and utilize several social and political spaces -- the Peasant Association meeting halls, drinking houses and other social establishments in town, even the farm itself -- identified as "men's spaces". Women also maintain their own gender-based social networks (such as *Baltina*, and women's extended family and friendship networks) that are centered, for the most part, around the household and that are organized to enable women to

meet their own gender-specific roles, responsibilities, and strategic interests. According to men and women alike, women's social networks play a significant role in the dissemination of information about new technologies from woman to woman, with women passing new information on to their husbands and male kin. Since women play a very limited role in farm production and decision-making in the participating communities, they did little by way of technology dissemination as they had neither the experience with the technologies nor the decision-making power to share them with others. In fact, only one PRIAM farmer in Wolecheti is a woman (no female PRIAM farmers at Boffa) and, as a widow and household head, she does have decision-making power over how the technologies are used. She has not, however, shared these technologies with anyone in the village or in neighboring communities. Like the elderly PRIAM farmer discussed above, she discussed the technologies with many of her female friends and family but, of course, most other women were not in a position to test the technologies. Many women reportedly expressed their interest in the technologies to their husbands but, due to the fact that men and women maintain, for the most part, exclusive gender-based social networks, a man would not request the use of a technology from a woman. In fact, within the context of local social and cultural norms, if a man were to visit the home of a widowed woman and request the use of a piece of property (be it a technology or otherwise) this would be taken, and perceived locally, as a gesture of courtship and/or an indication of that the man is poor (to "beg" from a woman) and lacking his own social and political networks. So, the ways in which technologies move from farmer to farmer are shaped by the nature and composition of people's social networks and by the social norms of a society that shape social organization and relations both within and across communities.

Gift, Exchange, Loan, and Sale: Social Relations and Types of Sharing

The sharing of improved seed and implements by PRIAM farmers with individuals outside the formal participatory research project is extensive both within and outside the project communities. Technologies are diffused through the following sharing mechanisms:

- given as a gift (seed),
- exchanged (improved seed exchanged for local seed material),
- loaned (implements and sometimes seed),
- sold (seed).

How farmers share technology with others depends on their relationship to different recipients. In most cases, seed is given as a gift to extended family members and to close friends. At Wolencheti and Boffa, for example, seed is commonly given as a gift (often in large quantities averaging 20-25kg) to the father of a man's wife. This gift is not a bridewealth obligation but is seen as a powerful symbolic gesture (of sharing and recompense) between a man and his father-in-law. Seed is given as a gift in large quantities only to extended family but may be given in smaller amounts (½ to 5 kg) to friends and neighbors, and to *jiggi* and *makanajo* members during farm activities. Seed is often given as a gift to acquaintances or other distant relations when such an individual is perceived to be poor or "struggling". Several PRIAM farmers, for example, have given seed to aged widows and other women heads-of-household in their community who have many social and material responsibilities (for children and other family members) and whose households are characterized by extreme vulnerability. Many PRIAM farmers reported to rarely give seed as a gift to anyone (outside of family) who is thought to be wealthier than themselves – since these farmers are financially or materially able to purchase the improved seed or exchange improved seed for local varieties. Wealth, again, plays a significant part in shaping patterns of diffusion and methods of sharing.

One of the most common methods of disseminating improved seed at the project sites is through exchange. While seed is given as a gift only to close relations, most PRIAM farmers are willing to exchange improved seed with the same quantity of a local variety with virtually anyone. Traders and consumers are not yet knowledgeable of differences between improved and local varieties, and so PRIAM farmers cannot sell improved seed at the market for a higher price than that of

local varieties. Because PRIAM farmers are interested to disseminate improved varieties (to share the benefits of new varieties with their relations), they are willing to exchange improved varieties with local varieties on an equal weight basis. Depending on household needs, PRIAM farmers either store the local grain for consumption or sell it at the market.

Less commonly, PRIAM farmers sell improved seed to friends, neighbors and others. Seed is typically sold to individuals who are uninterested in exchanging their local grain but prefer to pay for the improved seed. Seed is usually sold at the going market price for local grain (again to encourage the dissemination of improved varieties) although some PRIAM farmers are beginning to sell improved seed at higher prices (10-15% above the market price of the local variety). Seed is rarely sold to close relations above the market price for local varieties. However, a small number of PRIAM farmers have established community and cross-community farmer networks for the sale of improved seed. These networks represent business relationships where the price of improved seed is negotiated between buyer and seller. A small number of farmers also sell improved seed to the local representatives of the Ministry of Agriculture that is then distributed to farmers through the local extension system. According to farmers, however, the selling of seed to the MoA is risky and unreliable (the MoA often pays less than the agreed/negotiated price for seed and/or withdraws its interest in purchasing seed after an agreement has been reached). Community members typically find the price of improved seed sold by the MoA to be too high for most households to afford. Farmers' seed business networks are likely to constitute a more sustainable form of seed distribution system in the area. Support for farmers' dissemination initiatives could include training in the multiplication of high quality seed and small business skills.

Improved farm implements are not given as a gift, exchanged, or sold as PRIAM farmers only own one of each type of implement (due to the shortage of implements many PRIAM farmers have to share implements) and they cannot be multiplied within the community. Implements are usually loaned to family, friends, neighbors and other associates for a half or full day to plough one's land or to plant (row planter). The loaning of implements is often organized in conjunction with *makanajo* and *jiggi* field activities – a member of *jiggi* or *makanajo* will bring their implement during the plowing or planting of a member's farm. Although the loaning of implements provides a number of non-participating farmers with access to these technologies they need to be multiplied through a local manufacturer to ensure that the technologies are accessible to all interested farmers. Manufactures in Addis Ababa have begun the multiplication of the implements for sale. A system now needs to be established to make these technologies available to local markets. In the short-term, World Vision may be in a position to assume the crucial role of facilitating the transport of implements from the manufacturer to the market or to farmers directly, and the provision of micro credit for the purchase of the implements. The extension system may also play a role in the dissemination of implements since training on the operation and maintenance of implements will be necessary for first-time users of the technology. Whatever the system(s) of implement dissemination, or distribution, it is important that farmers can obtain the technology at a fair price to ensure that all wealth groups are able to access and use the implements.

Building Flexibility into Community-Based Research and Development Approaches: Farmer's Social Networks and Institutions as Entry Points

In some social and cultural contexts, and for specific kinds of research and development intervention, a community-based approach may in fact be the most effective means of carrying out a participatory research activity or project. The point is not to argue against community-based approaches entirely, but rather to explore other potential bases of social organization that may provide strategic and effective entry points for different kinds of research and development intervention and improve the quality and sustainability of our work. The research described here suggests that a more socially and culturally sensitive, and a more sustainable, approach is likely to be one which recognizes that various forms of informal networks and institutions exist within (and across) many communities and offer different opportunities for different types of intervention. As demonstrated above, informal social networks and customary institutions differ in character,

composition, and function and are dynamic forms of social organization that change in meaning over time and place. Rather than presuppose the utility and meaningfulness of "the community" as a basis for research and action, the opportunity within participatory research approaches is to explore the different manifestations or expressions of social capital among rural people and then to identify the range of local institutions and networks that could be used as potential entry points for different research programs and activities (see Sikana 1995).

The principle objective of participatory research is to improve the quality of research and technology development through the effective integration of rural people into project development, implementation, dissemination, and monitoring and evaluation. One of the critical findings documented in this report is that, in some social and cultural contexts, it may be more useful to work within and through local social networks and institutions rather than communities as such. Doing so should help ensure that we reach as many rural people - and categories of rural people - as possible, are sensitive to and work within local social and cultural realities, and are effective and sustainable in the long-term. Enhancing the participatory research strategies of international and national research centers by recognizing and working through local social networks and institutions will improve our work by:

- building more effective partnerships between formal science and local knowledge by working in collaboration with farmers' existing social networks and institutions through which knowledge is generated, used, maintained, and shared;

- enhancing the level and meaningfulness of local peoples' participation in research by working within and through local social relations rather than imposing potentially inappropriate constructs ("the community") and forming "farmer groups" that are not cognizant of, sensitive to, or adequately reflect, the nature of such relations;

- more effectively integrating (rather than marginalizing) different categories of people (defined on the basis of wealth, gender, age, and other axes of difference) into research and development initiatives;

- targeting the networks through which farmers disseminate technologies within and across communities thereby dramatically improving the "reach" of a project and new technologies;

- strengthening the capacity of local people to lobby and negotiate their individual and collective interests, on their own terms, within the formal research and extension systems.

Since local social networks and institutions have no hard boundaries, fixed meaning, or function, this report is not suggesting that researchers simply isolate such institutions and package them as ready-to-use entry points for all kinds of research and development intervention (Sikana 1995). A more realistic approach is one that examines the various kinds of local social networks and institutions and identifies the opportunities that each may offer in relation to different types of research and development activity. Based on the findings of this research, and supported by the work of Sikana (1995) in Tanzania, partnerships with farmers' networks and institutions are more likely to be effective groupings to work and communicate with, and are more likely to sustain research and development initiatives following the completion of a project.

Research and Policy Recommendations: Institutionalization and Scaling-up of Participatory Research

Throughout this report the research findings have been followed by a series of recommendations that build upon the research experiences of PRIAM farmers and scientists to improve participatory research processes and outputs. In the final section of the report several research and policy recommendation areas, focused principally on the institutional dimensions of participatory research work in EARO, will be discussed.

A Place For Farmers: Farmers' Organizations and the Scaling-up of Participatory Research

The question of "how" to scale-up or scale-out the results of participatory research, and the participatory research approach/process itself within a research institution, is an issue of great concern among many research scientists and management at the Ethiopian Agricultural Research Organization, and among participatory research practitioners more generally. Because participatory research approaches are so fundamentally different from conventional scientific approaches to development research, it is difficult to conceptualize what a genuine "bottom-up" research strategy would look like at the institutional level.

In the conventional system in Ethiopia (now being modified, as in many countries), technologies are developed on-station by national scientists working for national agricultural research institutions. Technologies go through a rigorous verification process where their usefulness (as defined by researchers) is determined; those found to be of "national interest" are then released at the national level and are distributed by the formal research and extension systems through a rather lengthy "trickle down" process to farmers. The flow of information and technologies within the conventional research system is unidirectional from the top-down. It is now well documented that standardized technologies developed through such approaches rarely reflect the diversity of experience, needs, and interests of different rural peoples and consequently are often not adopted. Involving the "end-users" of a technology at the beginning of, and throughout, the technology development process we now know improves the likelihood that technologies will meet the interests and needs of a particular "target" group of farmers (whether defined in terms of agro-ecological, social, cultural, economic, or other characteristics) and the probability of technology adoption and diffusion. Through participatory research approaches, farmers are active participants in technology development – the goal of which is not to produce one standardized technology (which will still only reflect the needs and interests of the farmers participating in its development) but a basket of technology options to address specific agricultural needs, one or more of which may be effective and appropriate to the interests of different farmers. The question then becomes, how do national research institutions scale-up the results generated, and technologies developed, though participatory research processes (i.e. how do we make research bottom-up?).

Within participatory research approaches farmers play a key role in the generation of knowledge, the development of technologies, and the dissemination of information and technologies to other farmers and communities. The effective scaling-up of the results of participatory research, and the scaling-up of the approach itself, will therefore require the active participation of farmers and other stakeholders at multiple levels.

In the recently developed Research-Extension-Farmer Linkage Strategy developed by EARO the need to integrate farmers, and rural people more generally, into the institutional framework of the national organization is being addressed. This institutional strategy is structured around the identified need to improve communication and collaboration between the formal research and extension systems and farmers so as to improve the efficiency, effectiveness, and appropriateness of agricultural research. The strategy involves the formation of Research and Extension Advisory Councils at the federal, regional, and research center (or zonal) levels, with the participation of farmers' organizations concentrated at the research center level. The genuine participation of farmers' organizations (whether they are Farmer Research Groups or local social organizations that incorporate an agricultural focus into their mandate) in an institutional manner would provide farmers with a forum to represent and negotiate their needs and interests during project and policy planning, prioritization and review, to share experiences and research results with other farmers' organizations within the zone, and to offer recommendations on how to improve participatory processes within the formal research and extension systems. With the participation of farmers' organizations, the Research-Extension Advisory Council at the research center level could also play a potential role in the scaling-up of participatory research approaches

(e.g. to new research sites selected to represent significant new sets of farmer-clients and circumstances), and the results (e.g. knowledge, new technologies) of on-farm research. Given the necessary interest in and commitment to participatory research within the Council, it could develop an institutional mechanism responsible for implementing and monitoring scaling-up initiatives. Such scaling-up initiatives might include:

- the establishment of a formal network of farmers' organizations active in participatory research activities (on-farm experimentation, dissemination work etc.) who meet two to three times per year to share experiences and knowledge, and to develop mechanisms for the testing and dissemination of information (farmer cross visits or field schools) and technologies between the farmers' organizations within the network;

- developing a system for documenting and reporting the results of on-farm experimentation with new technologies (performance of technologies, farmers' evaluations, etc.) which can then be recorded in a Participatory Technology Development database to be made accessible to research scientists and extension personnel throughout the country (see next section);

- annual meetings between researchers, extension personnel, and representatives of farmer organizations operating within a Research Center's jurisdiction, to plan, prioritize, monitor, and evaluate on-going participatory research initiatives.

In order for farmers' organizations to play a significant and meaningful role in the scaling-up of participatory research, such organizations must be internally strong and socially cohesive, have a clear and agreed-upon mandate and must represent and be accountable to a larger body of people (be it a neighborhood, a community, a Peasant Association, or other). To satisfy the mandate of a zonal research institution, it is also likely to be important that the partnerships with farmer organizations eventually represent adequate coverage of the range of agro-ecological and socio-economic conditions that the institution aspires to serve, and are prepared to work together in assisting the research institution to arrive at an agreed set of priorities and agenda. Whether we are dealing with a Farmer Research Group or a local social/farmers' organization, this may require capacity building exercises to enable such organizations to function well as a group, and to collaborate and work effectively with other partners (other farmers' organizations, the research and extension system, etc.).

Information-sharing: Establishing a National Participatory Technology Development Database

Scaling-up the results of participatory research work requires that the knowledge and experience generated through participatory processes be systematically recorded, documented, and made available to researchers, extension personnel, and perhaps other government bodies (including the Ethiopian Seed Enterprise parastatal) and non-governmental organizations working in agriculture.

A National Participatory Technology Development Database could achieve the following:

- track technologies developed under Participatory Technology Development projects (and all other technologies developed by EARO Research Centers to date);

- supply a description of the technologies, their use, and the problems or constraints that they address in the farming system;

- present information on the agro-ecological, social, and economic context under which each technology has been developed;

- provide an evaluation of the technologies by the researchers, extension personnel, and farmers involved in their development, including revealing any limitations to their adaptation and usefulness; and

- offer details on the collaborating Research Center where the technology was developed, the departments and person(s) responsible, where the technologies can be purchased, and their cost.

Optimally, this type of database would be made accessible via the Internet, which EARO's Researcher-Extension-Farmer Linkage Strategy already identifies as a valuable resource to encourage effective communication and collaboration between stakeholders. The advantages of an Internet-based Participatory Technology Development Database are that it:

- provides researchers and extension personnel with efficient access to up-to-date information about developed (or developing) technologies and their use;

- avoids duplication of research and technology development activities (and so limits waste of time and resources);

- keeps researchers, extension personnel and farmers "connected";

- enables farmer experiences and evaluations of technologies to reach researchers and extension personnel within and across zones and regions and to provide farmers in different areas with a "basket of options".

Unlike standard publications, information posted to an Internet-based Participatory Technology Development Database can be updated regularly and with relative ease. Each Research Center would be responsible for documenting its own technology development profiles (in collaboration with participating farmers' organizations) with a Database/Website Manager responsible for the design and day-to-day management of the database/website, and for communicating with the research centers regarding the status of the database. As there is little or no shortage of Information/Technology expertise in Ethiopia, the only priority to be addressed is to ensure that each research center is computer and Internet ready. Such an initiative would go a long way toward "connecting" researchers, extension personnel, and farmers active in participatory technology development programs and to ensure that the results of research work are scaled-up efficiently and effectively and accessible to all research and development practitioners. Looking into the future, similar Internet links could provide unique opportunities for farmers' organizations and local NGOs to have stronger and less dependent linkages to research and development organizations (e.g. IDRC's Acacia project sites in Uganda).

Institutional Capacity Building in Participatory Research

Multi-Disciplinary Team Building

In order for researchers to interact and collaborate effectively with farmers within participatory research initiatives, it is crucial that they bring together their diverse skills, expertise, and experience and work as a research team. Building and sustaining multi- or inter-disciplinary research teams is not, however, a simple process. All three research centers involved in PRIAM activities in Ethiopia (Nazreth Research Center, Awassa Regional Research Center, and Alemaya University of Agriculture) have experienced difficulty sustaining a multi-disciplinary approach in their work. These difficulties have much to do with the over-commitment of researchers to their own department-based projects, a lack of awareness of the advantages associated with multi-disciplinary research and a reward structure that encourages it, and the logistical, professional, and personal challenges associated with "teamwork". Despite some excellent achievements of the PRIAM teams, the experience of each team demonstrates that,

without effective and meaningful multi-disciplinarity in participatory research activities, only a small numbers of farmers' agricultural needs and interests can be addressed. As a result, such "participatory" research priorities are defined less by farmers' needs than by the available expertise of a partial team. An inability to address farmers' priorities adequately may in turn hamper the participation of certain groups of farmers in the medium- and long-term. Moreover, PRIAM researchers have realized that without an effective multi-disciplinary team a holistic or integrated research approach cannot be sustained.

Following reports that demonstrated the need for multi-disciplinarity at the PRIAM sites, the PRIAM coordinator and the Bean Program Leader at Melkassa Research Center both expressed interest in working toward strengthening the Center's participatory research work by catalyzing the formation of a multidisciplinary research team under PRIAM. In April 2000, a three-day Multi-Disciplinary Team Building Workshop was held at Melkassa Research Center to bring interested research scientists together to discuss potential means of multidisciplinary cooperation. A team of 13 researchers representing the Agronomy, Pathology, Agricultural Economics, Research-Extension, and the Maize, Bean, and Sorghum programs was established. During the three-day workshop researchers discussed the benefits and drawbacks of participatory approaches, conducted a field visit to farmers in both PRIAM sites around Nazreth to identify farmers' research priorities that have been neglected to date (due to the lack of a multi-disciplinary research team), and developed with farmers a research agenda for the next season.

While the building of multi-disciplinary teams will dramatically enhance the outputs of participatory research, there is also a need to develop the capacity of researchers in all departments in the application and use of social science research methods. In-field training of researchers in social science concepts and research methods (such as semi-structured interviewing, focus groups, and various PRA techniques) will, among other things, enable teams to identify and ensure the participation of different social and user groups within participating communities, to develop technologies that meet the needs of different groups or categories of farmer, and to effectively monitor and evaluate both the *product* and *process* of participatory research throughout each stage of the project cycle. In the medium- and long-term, strategies to integrate trained social science professionals into the institution and participatory research teams will go further to ensure that these issues are adequately addressed.

Strengthening GO-NGO Institutional Linkages

In conjunction with strong and capable multidisciplinary participatory research teams, the creation and strengthening of strong GO-NGO linkages will greatly enhance the quality and sustainability of participatory research initiatives. The PRIAM project at Surakoyo (managed by the Awassa Regional Research Center) has benefited from the strong collaborative linkages developed between Awassa ARC and Farm Africa. Collaboration between EARO (and other ARCs) and NGOs operating in Ethiopia provide a valuable opportunity not only to share project resources but to develop and fund, in partnership, research projects that stimulate appropriate on-farm experimentation with new technologies while ensuring the provision of seeds, inputs, and credit required. At the Alemaya project site the PRIAM team has developed strong ties with Catholic Relief Services, an NGO active in the Hararge region. Through this partnership, researchers are currently planning to multiply and disseminate the improved agricultural implements, tested and selected by farmers at the Nazreth project sites, to farmers at the Alemaya PRIAM site. The potential benefits of such GO-NGO linkages are many, and Melkassa Research Center's work would benefit from initiating collaboration with CARE and World Vision – NGOs active in the Nazreth area. World Vision has been active at both the Wolencheti and Boffa sites for many years; the reason for the minimal collaboration between the two organizations to date is that inter-institutional collaboration is not simple. Each institution has their own research mandate, approach, and philosophy and each has its own kinds or expertise, human and material resources, and institutional capacities. However, these differences should be perceived as strengths and as a justification for inter-institutional collaboration. Very recently, PRIAM

researchers have begun to discuss the possibility of collaborating with World Vision at the Wolencheti site by drawing on each other's strengths and capacities. In the second phase of the PRIAM project, researchers working in Wolencheti are interested in supporting farmers' initiatives to develop a local seed multiplication and distribution system. PRIAM researchers can provide much of the technical expertise and training required for seed multiplication activities but MARC (and EARO more generally) lack the mandate or capacity to provide the seed, credit, and small business training required by such an initiative. World Vision, and potentially other NGOs, are capable of contributing to many of these development needs. Communication and partnership between MARC and World Vision will thus greatly enhance the quality and sustainability of their participatory research, and achieve more than either organization could do alone.

Strengthening Participatory Research Professional/Peer Networks

Participatory research is very new for most PRIAM researchers in Ethiopia (and throughout East Africa). It involves new ways of conceptualizing agricultural research and technology development and new methodological tools and approaches that differ sharply from the conventional research system. Because participatory research is a relatively new approach there is not yet a critical mass of researchers who utilize participatory methodologies, and so it is often the case that their practitioners do not have professional ties with others engaging in (and struggling with) similar approaches and with whom they should be sharing experiences, ideas, and insights, and working through research-related difficulties. Establishing professional support networks for participatory research practitioners under PRIAM (and perhaps beyond) would go a long way toward reducing the sense of professional isolation (and in some cases marginalization) often experienced by those researchers already working with participatory approaches within conventional research settings.

Email listserves often constitute a constructive forum for the positive and meaningful exchange of knowledge, experiences, and ideas between researchers (and perhaps extension personnel) who are working in new and innovative research areas (such as participatory research, gender analysis, etc.) and who are professionally and/or geographically isolated. Access to a participatory research listserve would enable researchers to post ideas, questions or concerns related to their work and to receive timely responses from peer professionals, and to stimulate on-going discussion groups that focus on specific issues in participatory research (e.g. gender/social analysis, PRA, etc.). Listserves not only represent occasions for peer learning but may also create opportunities for collaboration between researchers and institutions. Although some relevant listserves do exist (e.g. those of CIAT/PRGA for participatory plant breeding and for the gender aspects of participatory research), access by individual researchers in many African research institutions including those in Ethiopia are limited by lack of easy individual access to email and the difficulty in addressing listserve email messages to individuals rather than to an office email address.

In addition to listserves, other opportunities for peer interaction and learning may be explored to encourage the exchange of ideas and experience and peer monitoring and evaluation. Activities such as the PRIAM Monitoring Tour bring participatory research practitioners together, often from different countries within the region, to learn from each other's experiences, to monitor and evaluate the progress, achievements, and difficulties experienced in one another's projects, and to explore new conceptual and methodological terrain. My participation in the 1999 PRIAM Monitoring Tour in Western Kenya provided the occasion to observe and experience the obvious advantages of such peer learning exercises and to view the positive impact that the event had on the participating PRIAM and AHI researchers. The Monitoring Tour created a constructive space within which participants genuinely shared experience and generated new ideas. Peer learning activities, of this kind should be encouraged as opportunities to enhance the quality of our work.

References

Abate, T. 1998. Land, Capital and Labour in the Social Organization of Farmers: A study of household dynamics in southwestern Wollo, 1974-1993. Social Anthropology Dissertation Series No. 4. ed. A. Pankhurst. Addis Ababa, Ethiopia: Department of Sociology and Social Administration, Addis Ababa Ethiopia.

Adugna, W. and A. Tesfaye. 1999. Participatory Research at Nazreth, Ethiopia. In Participatory Research for Improved Agro-Ecosystem Management: Proceeding of a Synthesis Workshop, Nazreth, Ethiopia, 17-21 August 1998. Network on Bean Research in Africa, Workshop Series, No.38. ed. C. Farley. Kampala, Uganda: CIAT.

Ashby, J., T. Gracia, M. del Pilar Guerrero, C.A. Quiros, J.I. Roa, J.A. Beltran. 1995. Institutionalizing Farmer Participation in Adaptive Technology Testing with the 'CIAL'. Agricultural Research and Extension (AgREN) Paper No. 57, July. London:ODA.

Aspen, H. 1993. Competition and cooperation: North Ethiopian Peasant Households and Their Resource Base. Working Papers on Ethiopian Development, No. 2/93. ed. E. Reskaft. Trondheim, Norway: University of Trondheim.

Birmeje, B. 1988. Villagization and Rural Transformation in Ethiopia. Unpublished essay, Department of Political Science and International Relations, Addis Ababa University.

Cohen, J. and N. Isaksson. 1986. Villagization in the Arsi Region of Ethiopia. Report prepared by SIDA to the Ethio-Swedish Mission on Villagization in Arsi Region, December 1-14 1986. Uppsala: International Rural Development Center, Swedish University of Agricultural Sciences.

Engel, P. B. Haverkort, J. Jiggins. 1991. Concepts and Activities. In Participatory Technology Development in Sustainable Agriculture: A Compilation on ILEIA Articles, Selected Bibliography. The Netherlands: ILEIA.

Haverkort, B. 1991. Farmers' Experiments and Participatory Technology Development. In Joining Farmers' Experiments: Experiences in Participatory Technology Development, eds. Haverkort, B., J. van der Kamp, A. Waters-Bayer. London: Intermediate Technology Publications.

Lewis, H. 1974. Neighbors, friends, and kinsmen: principles of social organization among the Cushitic-speaking peoples of Ethiopia. Ethnology, 13 (2), pp. 145-158)

Lirenso, A. 1990. Villagization: Policies and Prospects. In Ethiopia: Rural Development Options. pp.135-143. Eds. Pausewang, S., F. Cheru, S. Brune, and E. Chole. London: Zed Books.

Putnam, R.D. 1993. The Prosperous Community: Social Capital and Public Life. In The American Prospect, no.13, Spring.

Sikana, P. 1995. The Participatory Training Consultancy on the Assessment and Identification of Formal and Customary Village Institutions. Unpublished paper for the Government of Tanzania, under assignment from the Overseas Development Administration (ODA).